

*Coming Climate Crisis? Perhaps, but Beware the Solutions*

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Abstract

Over the past several decades, there has been a growing awareness that climate changes in substantial ways, that human activities are having an impact on climate change, and that climate change can have major consequences for human societies. Unfortunately, along with this realization has come a strong polarization within the scientific community and outside of it regarding what if anything should be done to reduce negative human impacts and/or to attempt to control climate.

This book places recent climate change in the context of the very long term history of change on planet Earth and warns that our understanding of climate change remains sufficiently incomplete that we should be extremely cautious about implementing proposed massive geoengineering schemes intended to alter future climate conditions. The book treats with respect the various viewpoints in the highly polarized discussions regarding climate change, following a basic assumption that the major scientists on each side of the issues have valuable points to bring to the table. The topic is too important to become endlessly mired in contentious polarization.

In brief, the book's 13-chapter sequence is as follows:

Chapter 1 ("Introduction") introduces the key issues involved and provides a short primer on relevant aspects of the Earth system, including major Earth system components and processes.

Chapter 2 ("4.6 Billion Years of Global Change") provides a summary in a few dozen pages of the enormous changes the Earth has undergone during its 4.6-billion-year existence. Among much else, it shows that the Earth system has experienced much hotter as well as much colder conditions than today's, a fact that is relevant to understanding the climate system and the confusion regarding it, yet does not affect the potential seriousness of future climate change. The chapter also makes explicit the interconnectedness of the Earth system, the great uncertainty in our understandings of the Earth's past, and the fact that our understandings continue to evolve.

Chapter 3 ("Abrupt Climate Change") narrows down from the very broad overview of Earth history given in Chapter 2 to focus on the fact that prior to the past several thousand years, the Earth on numerous occasions experienced very abrupt climate changes. This is a sobering reality, as it indicates that we could be in for much greater and more rapid climate change than modern humans have experienced so far. In fact, we could unwittingly precipitate a troublesomely abrupt climate change.

Chapter 4 ("A Short History of Human Impacts") summarizes many of the impacts that humans have had and are having on the Earth system. This includes the limited

impacts in the distant past, the increased impacts with the invention and spread of agriculture, and the much more severe impacts since the start of the Industrial Revolution.

Chapter 5 (“The Future”) explains why some people are so concerned about future climate, based on mainstream projections of continued global warming and its numerous unfavorable consequences, plus why other people do not share those concerns. Consideration of climate-altering geoengineering proposals derives in large part from the troubling nature of the climate predictions.

Chapter 6 (“Good Intentions Gone Awry”) cautions that good intentions – including the intentions behind the proposals for massive geoengineering – do not necessarily lead to good results. This sad reality is illustrated with cases ranging from the misguided killing of cats and dogs during the 1665 London Plague to the purposeful addition of lead to gasoline and paint.

Chapter 7 (“Geoengineering Schemes”) summarizes several of the most-discussed geoengineering schemes, with comments about the dangers involved. This could be the book’s scariest chapter for those concerned about the future of our planet, as some of the schemes include potentially quite damaging activities, such as repeatedly pouring massive amounts of particulate matter into the upper atmosphere.

Chapter 8 (“The Record on Smaller Scale Attempted Modifications”) discusses earlier, smaller attempts to modify the environment and how they have fared, focusing in particular on attempts at rainmaking, hail suppression, and taming hurricanes. The lack of success in these smaller efforts should be cautionary when it comes to considering the much larger-scale geoengineering proposals.

Chapter 9 (“The Possible Fallibility of Even a Strong Consensus”) warns through historical examples that even the support of experts and a strong scientific consensus by no means guarantee that a position is correct. Science is constantly evolving, and it is part of the regular course of scientific development that consensus views sometimes get overturned.

Chapter 10 (“The Unknown Future: Model Limitations”) describes some of the imperfections in the global climate models used to create the climate projections that have caused such consternation about the future and have led to considerations of massive geoengineering schemes. These models are the best tools we currently have for climate projection, and certainly their results should be weighed heavily in considerations about future climate, but it is important to recognize their limitations.

Chapter 11 (“Compounding Social Pressures”) examines the social pressures that make the consensus view of the scientific community perhaps seem to be a stronger consensus than it really is.

Chapter 12 (“What Are the Alternatives”) points out some of the alternatives now available or on the horizon that offer possibilities for correcting or reducing human-induced climate change with far less risk than many of the massive geoengineering proposals and with a far greater chance of addressing a broader range of human-induced impacts than the typically narrow global-warming focus of many of the geoengineering schemes.

Chapter 13 (“Closing Plea”) concludes with a plea summarizing the argument that we are not yet knowledgeable enough to undertake the most severe of the massive geoengineering proposals without substantial risk to the Earth system and the life within it. The book does not argue that geoengineering should never be undertaken, only that we need to be extremely cautious about it. Most important is that we avoid doing even greater damage in the attempt to correct for an uncertain anticipated damage.